

In the Specification:

Please delete the heading at **page 1, above line 1.**

Please insert a new heading at **page 1, above line 1** as follows:

**TITLE OF THE INVENTION**

Please insert a new heading at **page 1, following line 1, as follows:**

**FIELD OF THE INVENTION**

Please insert a new paragraph at **page 1, above line 2, as follows:**

Printed circuit boards are produced with circuit components on the top surface of a carrier body or printed circuit board and with thermal lead-through contacts leading to the back side of the board.

Please insert a new heading at **page 1, above line 2, (after the previously inserted paragraph at page 1, above line 2), as follows:**

**BACKGROUND INFORMATION**

Please insert a new heading at **page 3, above line 15, as follows:**

**SUMMARY OF THE INVENTION**

Please amend the paragraph at **page 3, lines 19 to 20, as follows:**

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This object is achieved according to the invention by the ~~features of the characterizing clause of patent claim 1.~~  
combination of the following steps:

- a) first applying a first metallization base layer to said carrier body and to said thermal lead-through vias,
- b) screen printing a viscous material into said thermal lead-through vias thereby closing said thermal lead-through vias to prevent solder of a following soldering step from passing through said thermal lead-through vias,
- c) removing, following curing of said viscous material, any excess of said viscous material from the underside of the carrier body, and
- d) second applying at least one further metallization layer to the first metallization base layer outside said viscous material on the inside of said thermal lead-through vias and on the upper side and on the under side of the carrier body.

Please delete the paragraph at page 3, lines 21 to 22.

Please insert a new heading at page 7, above line 6, as follows:

Brief Description of the Drawings

Please amend the paragraph at page 7, lines 9 to 11, as follows:

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Fig. 1 shows ~~[[in]]~~ a sectional view of a portion of a circuit arrangement arranged on a carrier body including a power structural component; and

Please insert a new heading at page 7, above line 15 as follows:

DETAILED DESCRIPTION OF A PREFERRED EXAMPLE EMBODIMENT AND OF THE BEST MODE OF THE INVENTION

Please amend the paragraph at page 7, line 15 to page 8, line 20, as follows:

The circuit arrangement on the upper side 12 of a carrier body 5, which for example is constructed as a printed circuit board, comprises in addition to other active and passive structural components also at least one power component 1 having connector contacts 3 which are to be conductively connected with the contact pad 16 which in turn is connected to the printed circuit structure applied on the carrier body or printed circuit board 5, for example in the form of a copper printed circuit structure for example coated by a nickel-gold (AuNi) coating. The lead-throughs 7, for example in the form of bores also referred to as thermal vias 7, are provided in the printed circuit board 5 for the vertical dissipation of heat which is produced during the operation of the circuit arrangement. The heat to be dissipated is produced particularly by the power components 1. Hence the lead throughs 7 are provided in the area of the power components 1. The walls of the lead-throughs 7 are completely covered

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over the entire surface area by a base metallization layer 6, for example of copper, to form the thermal through contacts or thermal vias 7. After metallization the bores still have a diameter of, for example 0.5 mm. The power components 1 rest with their cooling flag 2 on the openings 15 on the upper side of the carrier body or printed circuit board 5. The openings 15 lead into the thermal vias 7 so that an efficient heat transfer from the upper side 12 of the printed circuit board 5 to the underside 13 of the printed circuit board 5 is made possible. The heat to be dissipated from the underside 13 of the printed circuit board 5 passes by means of cooling ribs 11 to a cooling system. The cooling ribs 11 are made of cooling sheet metal and are part of a metallic cooling body 10. A thermally conducting, electrically insulating film 9, referred to as insulation film or heat conducting film, is arranged between the underside 13 of the printed circuit board 5 and the cooling sheet metal 10 for ~~electrically insulating~~ electrical insulation.

Please amend the paragraph at **page 8, line 21 to page 9, line 2**, as follows:

The circuit components of the circuit arrangement are, for example, to be soldered to the top surface 12 of the printed circuit board or carrier body 5 by means of a reflow soldering process. In order to prevent a throughflow of the solder 4 from the upper side 12, of the printed circuit board 5 to the underside 13 of the board 5

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during the soldering of the components on the upper side 12, which is the reflow soldering side or attachment side of the board 5, the thermal vias 7 are closed from the underside 13 of the board 5 prior to the soldering operation by means of a screen printing process.

Please amend the paragraph at **page 9, line 3 to page 10, line 3**, as follows:

After the application of the base ~~metallizing~~ metallization layer 6, for example of copper having a coating thickness of 70  $\mu\text{m}$  on the surface of the board 5 and in the thermal vias 7 and the structuring thereof the thermal vias 7 are closed by means of screen printing. For this purpose a screen printing film having a diameter of, for example 0.7 mm, is applied around the openings 14 of the thermal vias 7 on the underside 13 of the board 5. For example, the openings 14 have a diameter of 0.5 mm. For this purpose the diameter of the screen printing film does not need to be particularly precisely determined, i.e. the film may have wide tolerances. The screen printing material 8, for example a solid epoxy material, is printed into the openings 14 of the thermal vias 7 on the underside 13 of the printed circuit board 5. A two-step printing operation is employed, also referred to as double-printing or twice wet-on-wet printing. The printing is performed in such a way that a certain filling volume is achieved in the thermal vias 7, that is, a minimal filling level of the screen printing material in the thermal vias 7 at the

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narrowest point thereof is achieved. For example, the filling level should be at least 15% of the thickness of the printed circuit board or carrier body 5. Further, the printing is performed so that the cured screen printing material 8 does not have any defects, for example, inclusions, air bubbles, pores, etc. The printing is performed so that no screen printing material flows through the lead throughs or bores to avoid contaminating the ~~[[top]]~~ upper side 12 or component side of the printed circuit board 5. A certain layer coating of the screen printing material 8 results on the surface of the underside 13 of the printed circuit board 5. For example, the layer thickness of the screen printing material 8 is within the range of 30 to 40  $\mu\text{m}$ .

Please insert a new paragraph at page 10, following line 29, as follows:

Although the invention has been described with reference to specific example embodiments, it will be appreciated that it is intended to cover all modifications and equivalents within the scope of the appended claims. It should also be understood that the present disclosure includes all possible combinations of any individual features recited in any of the appended claims.

**[RESPONSE CONTINUES ON NEXT PAGE]**

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